

ABSTRACT

Methods are disclosed for treating deposited gate dielectric materials, in which the deposited dielectric is subjected to one or more non-oxidizing anneals to densify the material, one or more oxidizing anneals to mitigate material 5 defects, and to a nitridation process to introduce nitrogen into the gate dielectric. The annealing may be performed before and/or after the nitridation to mitigate deposition and/or nitridation defects and to densify the material while mitigating formation of unwanted low dielectric constant oxides at the interface between the gate dielectric and the semiconductor substrate.